IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit: 3723
Examiner: Hadi Shakeri
Confirmation No.: 7367

In Re PATENT APPLICATION Of:

Applicant: Ming-Hua Li et al.

Serial No.: 10/722,429

Filed: November 28, 2003

For: CONSTANT FORCE SOCKET

Attny Ref.: LIE 178

BRIEF ON APPEAL

BRIEF ON APPEAL

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents, P.O. Box 1450
Alexandria, VA 22313-1450

This paper submitted **July 5, 2005** (day after holiday)

Sir:

The Appellants appeal from the Final Official Action mailed on December 3, 2004.

The fee for filing an appeal brief is attached. A Notice of Appeal was filed on May 3, 2005, and no extension fee is due. However, please charge our Deposit Account No. 18-0002 if any fees are needed to enter this paper, and please advise us accordingly. It is noted that no petition is required because of the authorization to charge, but please consider this paper a petition for extension of time if needed.

REAL PARTY IN INTEREST

The real party in interest is Industrial Technology Research Institute. No. 195, Sec. 4, Chung Hsing Road, Chu Tung Jen, Tai Ping City, Tai Chung City, Taiwan, R.O.C.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

Claims 9-11 are pending, rejected, and appealed. Claims 1-8 were canceled.

STATUS OF AMENDMENTS

The Amendment of February 17, 2005, which corrected a typographic error, will be entered for appeal, according to the Advisory Action of April 13, 2005.

SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent claim 9 recites

A constant force socket ...

The phrase "constant force" means that the force (more precisely, the torque) exerted through the socket is maintained constant, because the socket slips internally when the applied torque exceeds a limit. The specification at page 1, line numbered as 7 and page 2, lines 4-8 sets out this function. Claim 9 continues,

... comprising:

a coupling hole [11] *having an open end and a closed end;*

an inner hole [12] *having an open end and a closed end;*

wherein the closed end of the coupling hole abuts the closed end of the inner hole;

As shown in Figs. 2-3 and described on page 3, the coupling hole 11 has a female hex shape to grip a bolt head (not shown), and the inner end is closed. Figs. 3-4 show that the inner hole 12, on the other side of the socket body 10, also has a closed bottom. The closed bottoms abut.

Fig. 5 best shows the next-recited features:

> ... *an interior threaded region* [14] *located in said inner hole* [12] *proximate said open end thereof;*
>
> *a first set of teeth* [13] *radially disposed in an interior of said inner hole proximate said closed end of said inner hole;*

The teeth 13, which lie at the bottom of the closed end of inner hole 12 (Fig. 2), engage corresponding teeth on a rachet wheel 20, shown in Fig. 6, which is inserted into the inner hole 12 (page 3, line 25). The ratchet wheel has an axial tool hole 21, that engages a wrench (not shown), and the teeth 13 act to limit rotation of the rachet wheel 20 relative to the socket body 10, all described in the following portion of claim 9:

> *a ratchet wheel* [20] *having a first end and a second end and having a region of relatively greater diameter terminating in said first end and a region of relatively smaller diameter terminating in said second end* [Fig. 6];
>
> *wherein the ratchet wheel is mounted in the inner hole* [12; Fig. 5];
>
> *a second set of teeth* [22; Figs. 6 and 6A] *radially disposed around said first end of said ratchet wheel;*
>
> *wherein said first set of teeth* [13] *and said second set of teeth* [22] *are adapted to engage one another;*

a torsion tool hole [21] *at said second end of said ratchet wheel;*

Thus, the basic arrangement is two parts (10, 20) that are relatively rotatable but are rotatably engaged by means of teeth (13, 22).

The honorable Board is invited to consider that, with the inclined surfaces of the teeth (Fig. 6A) the resistance to slipping between the two parts 10, 20 depends on an axial force between them. If they are not pushed together strongly then the teeth will easily ride up on each other and relative rotation is possible; if pushed together strongly then the teeth will be harder to disengage, and the resistance to relative rotation will be great.

Furthermore, the *amount* of resistance to relative rotation will vary with the axial force. Therefore, by adjusting the axial force the resistance to relative rotation will be adjusted, and therefore the maximum torque transmittable through the socket will be adjusted. Neglecting friction (this can safely be done if there is grease in the socket), the maximum torque will depend directly on the axial force between the socket body 10 and the ratchet wheel 20, because the axial force generated by the teeth, which counters the applied axial force, is proportional to the applied torque and depends on the inclination angle of the teeth.

The mechanism which varies the axial force, described on page 4 of the specification, is recited next in claim 9:

a spring [30; Fig. 2] *mounted around said region of said ratchet wheel of relatively smaller diameter and abutting at a first end thereof said region of said ratchet wheel of relatively greater diameter;*

This arrangement allows one end of the spring to push the two parts 10, 20 together.

... and

a pressure adjusting element [40] *having an exterior threaded region* [41] *adapted to threadably engage said interior threaded region* [14] *in said inner hole;*

wherein a first side of said pressure adjusting element contacts a second end of said spring; and

wherein rotation of said pressure adjusting element [40] *within said inner hole* [12] *adjusts an amount of pressed force on said spring and thus on said ratchet wheel.*

Screwing in the adjusting element 40 increases the axial compression of the spring 30, thus the axial force between the teeth 13 and 22, and therefore increases the amount of torque that the socket will transmit (specification, page 5, line 6 to page 6, line 4). The spring is long enough to allow the ratchet wheel 20 to retract enough to disengage the teeth (page 5, lines 6-23).

The maximum torque can be set permanently, after adjustment, by locking the adjusting element 40 in place; alternatively, it can be left free to turn to adjust the torque maximum to a different setting (specification page 5, lines 1-5).

The dependent claims recite additional features. Claim 10 recites that

each tooth in said first set of teeth has an inclined side and a vertical side; and

each tooth in said second set of teeth has an inclined side and a vertical side.

which has the effect of making the torque limitation one-way; when the vertical sides of the teeth engage, there is no limit to the amount of torque that can be applied. This is useful for allowing

the reverse or loosening torque to be arbitrarily great while limiting the tightening torque (specification page 6, lines 15-17).

Claim 11 is analogous to claim 10 and recites

each tooth in said first set of teeth has a first inclined side and a second inclined side and wherein said first inclined side and said second inclined side slope at different angles from one another; and

each tooth in said second set of teeth has a first inclined side and a second inclined side and wherein said first inclined side and said second inclined side slope at different angles from one another.

This provides two different torque maxima, depending of the direction of relative rotation of the socket body 10 and ratchet wheel 20.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The issue is whether claims 9-11 are obvious under 35 U.S.C. §103(a) as being unpatentable over Le Chot (US 1,328,087) in view of Sedgley (US 1,521,331).

ARGUMENT: OBVIOUSNESS OF CLAIM 9 (PRESSURE ADJUSTING ELEMENT)

The Examiner points to cap 4 of Le Chot as anticipating the claimed pressure adjusting element. Cap 4 is screwed down onto the body 1 (Fig. 1) and compresses a spring 10, which bears on a ratchet 7 (Fig. 1). Thus, the general arrangement of Le Chot is similar to the Appellants'.

Le Chot's cap 4 is shown in Fig. 1 to be fully screwed down, to the end of its downward travel, which suggests that the cap 4 is screwed tight to secure it against loosening.[1] There is no teaching of leaving the cap 4 loose, or screwing and unscrewing the cap to adjust the spring compression. Instead, Le Chot teaches adjustment by *replacing* the spring 10. Le Chot states at page 1, line 103:

> The strength or tension of the expansible member 10 determines the tightness of the work, and for this reason member 10 is readily removed so that it can be replaced with a similar member of either greater or less strength or tension.

From this passage it is clear that "strength or tension" means the spring constant[2] of the spring 10, and it does not mean applied force or compression. The compression of the spring 10 is fixed, because the axial position of the cap 4 is fixed, and therefore so is the force exerted by the spring 10 on the ratchet 7.

To summarize, Le Chot discloses a mechanism that arguably *could* be used to adjust the compression of the spring 10, but the reference does not recognize this possibility and teaches

---

[1] The honorable Board is invited to note that loosening of the cap 4 will likely be caused by friction of the shank 6 against the cap opening 5, because the direction for unscrewing the cap 4 is also a driving direction, i.e., the direction for loosening the nut N (the honorable Board is invited to note the slopes of tooth of the ratchet 7 in Fig. 1, which show that motion in both directions is intended).

[2] The honorable Board will recall that the spring constant of a spring is the ratio of compression force to decrease in spring length. This is a fundamental attribute of a spring and cannot be changed except by physically changing the spring. Thus, the spring 10 of Le Chot has a fixed spring constant, according to which the axial force it exerts varies in proportion to its compression.

that compression is varied by changing one spring 10 for another. Le Chot teaches that the cap 4 is fixed in position and is removed only to change the spring, after which it is screwed down tight again.

Does Le Chot disclose the Appellants' claimed "pressure adjusting element ... wherein rotation of said pressure adjusting element within said inner hole adjusts an amount of pressed force on said spring," or not? Or, to rephrase the question more specifically: ***Would the person of ordinary skill in the art have come up with the idea of partially unscrewing the cap 4 of Le Chot, so as to adjust the spring compression?*** If the answer is Yes, then claim 9 is obvious over Le Chot; if No, then claim 9 should be allowed because the cap 4 is not a "pressure adjusting element."

The Appellant believes the answer to this question is No, because there is nothing in Le Chot to suggest partially unscrewing the cap 4,and the person of ordinary skill does only what is suggested. Le Chot explicitly instructs the person of ordinary skill to replace the spring 10 with a different spring if the compression is to be changed, and the person of ordinary skill, who lacks any imagination or inventiveness, would have done exactly what the prior art teaches, and nothing else.

The secondary reference, Sedgley, also fails to disclose any mechanical adjustment of spring pressure, or any variation of spring pressure to adjust the maximum torsion. Sedgley shows (Fig. 5) square teeth which are not intended to allow a maximum torque transmission. Sedgley teaches that the spring is compressed only by the user (page 2, lines 48-64 and page 3, lines 25-33) and in fact the spring can be omitted (page 3, lines 33-43).

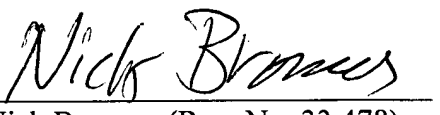
Thus, no combination of the references, even if obvious to combine (not admitted), would reach the Appellants' claimed pressure adjustment mechanism. There is no disclosure from either reference toward "rotation of said pressure adjusting element within said inner hole adjusts an amount of pressed force on said spring and thus on said ratchet wheel."

ARGUMENT: OBVIOUSNESS OF CLAIM 9 (COMBINATION)

The Sedgley reference is applied against claim 9 for replacing Le Chot's shank 6 with a socket for the Allen wrench disclosed by Sedgley (Office Action of December 3, 2004, last full paragraph on page 3). However, the Appellants submit that combination of the references is not suggested. The square teeth of Sedgley, as mentioned above, are not capable of providing a maximum torque at which slipping occurs, because the teeth have vertical sides. The intended function of Sedgley is different from that of Le Chot, and it is not clear why they should have been combined. In fact, the Examiner presents no reason whatsoever for combining the references, contrary to MPEP §2143, and therefore has not presented a *prima facie* case of obviousness; this in itself is reason enough for the honorable Board to overturn the rejection.

For the reasons above, the honorable Board is requested to reverse the rejection.

Respectfully submitted,



July 5, 2005
Date

Nick Bromer (Reg. No. 33,478)
RABIN & BERDO, P.C.
CUSTOMER NO. 23995
Telephone: (202) 371-8976
Telefax : (202) 408-0924

APPENDIX A

Claims 1-8 (canceled)

Claim 9. (previously presented): A constant force socket comprising:

a coupling hole having an open end and a closed end;

an inner hole having an open end and a closed end;

wherein the closed end of the coupling hole abuts the closed end of the inner hole;

an interior threaded region located in said inner hole proximate said open end thereof;

a first set of teeth radially disposed in an interior of said inner hole proximate said closed end of said inner hole;

a ratchet wheel having a first end and a second end and having a region of relatively greater diameter terminating in said first end and a region of relatively smaller diameter terminating in said second end;

wherein the ratchet wheel is mounted in the inner hole;

a second set of teeth radially disposed around said first end of said ratchet wheel;

wherein said first set of teeth and said second set of teeth are adapted to engage one another;

a torsion tool hole at said second end of said ratchet wheel;

a spring mounted around said region of said ratchet wheel of relatively smaller diameter and abutting at a first end thereof said region of said ratchet wheel of relatively greater diameter; and

a pressure adjusting element having an exterior threaded region adapted to threadably engage said interior threaded region in said inner hole;

wherein a first side of said pressure adjusting element contacts a second end of said spring; and

wherein rotation of said pressure adjusting element within said inner hole adjusts an amount of pressed force on said spring and thus on said ratchet wheel.

10. (previously presented): The constant force socket of Claim 9 wherein:

each tooth in said first set of teeth has an inclined side and a vertical side; and

each tooth in said second set of teeth has an inclined side and a vertical side.

11. (previously presented): The constant force socket of Claim 9 wherein:

each tooth in said first set of teeth has a first inclined side and a second inclined side and wherein said first inclined side and said second inclined side slope at different angles from one another; and

each tooth in said second set of teeth has a first inclined side and a second inclined side and wherein said first inclined side and said second inclined side slope at different angles from one another.